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Subject: FINAL REPORT FOR THE SOIL SAMPLES FROM 216-Z-9 TRENCH-COLLECTED DURING MARCH AND APRIL OF FISCAL YEAR 2004

SDG 22252004 0073

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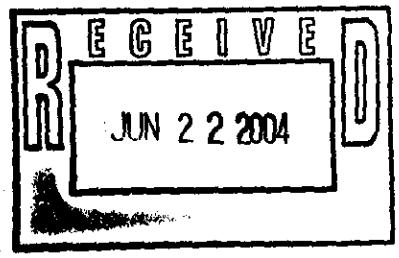

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June 17, 2004

CH2M-0401824

Mr. S. J. Trent, Manager
Environmental Information Systems
Fluor Hanford, Inc.
Post Office Box 1000
Richland, Washington 99352-0450

Dear Mr. Trent:

FINAL REPORT FOR THE SOIL SAMPLES FROM 216-Z-9 TRENCH-COLLECTED DURING MARCH AND APRIL OF FISCAL YEAR 2004

References:

1. HNF-SD-CP-QAPP-016, "222-S Laboratory Quality Assurance Plan," Revision 8, dated January 29, 2004.
2. 216-Z-9 Trench Characterization Borehole Sampling and Analysis Concurrence for Analytical Requirements, dated October 2, 2003.
3. Interoffice Memorandum, H. L. Anastos, FH, to Distribution, "Semi-Volatile Organic Compound Analysis," FH-0300526, dated February 3, 2003.
4. Interoffice Memorandum, H. L. Anastos, FH, to Distribution, "Volatile Organic Compound Analysis," FH-0300583, dated February 3, 2003.
5. SW-846, "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods," Revision 3, U.S. Environmental Protection Agency, Washington, D.C., dated December 1996.

This letter and four attachments represent the final analytical data report for the soil samples from the 216-Z-9 characterization borehole that were received at the 222-S Laboratory between March 24 and April 21, 2004. The samples were analyzed in accordance with Reference 1 through Reference 5.

Should you have questions regarding this matter, please contact R. A. Bushaw at 373-4314.

Very truly yours,

Ruth A. Bushaw

Ruth A. Bushaw, Project Coordinator
Analytical Project Management

dtb

Atttachments (4)

CH2M-0401824

Attachment 1

NARRATIVE

Consisting of 14 pages, including coversheet

222-S LABORATORY

FINAL REPORT FOR THE SOIL SAMPLES FROM 216-Z-9 TRENCH–COLLECTED DURING MARCH AND APRIL OF FY 2004

1.0 INTRODUCTION

Seven soil samples from the 216-Z-9 characterization borehole were received at the 222-S Laboratory between March 24 and April 21, 2004. The samples were analyzed in accordance with the *222-S Laboratory Quality Assurance Plan* (Reference 1), *216-Z-9 Trench Characterization Borehole Sampling and Analysis Concurrence for Analytical Requirements* (analytical instructions) (Reference 2), *Semi-Volatile Organic Compound Analysis* (Reference 3), and *Volatile Organic Compound Analysis* (Reference 4), referenced in the cover letter.

A Data Summary Report is included as Attachment 2. The correlation between the customer sample identification number and laboratory identification numbers is presented in the Sample Breakdown Diagrams included as Attachment 3. Copies of the Chain of Custody and Generator Knowledge Information forms are included as Attachment 4.

2.0 SAMPLE APPEARANCE

For easier tracking of results, the samples were logged into the laboratory database as four different sample delivery groups (SDG), as noted in the following.

SDG 222S20040061—This SDG consists of one customer sample numbered B17N61. This sample was collected on March 23, 2004. It was delivered to the laboratory on March 24, 2004, in three 40-mL amber bottles with septum lids. Analysis for low-level volatile organic compounds (VOC) was the only request for this sample. The sample was described as dark brown, medium coarse sand.

SDG 222S20040073—This SDG consists of three customer samples numbered B18XW3, B18XR8, and B190T8-A. Samples B18XW3 and B18XR8 were collected on April 8, 2004. Sample B18XW3 was delivered to the laboratory on April 14, 2004, in three 40-mL amber bottles with septum lids for low-level VOC analysis only. For sample B18XR8, three 5-g En Core® samplers were received on April 8, 2004, for high-level VOC analysis. On April 16, 2004, two 60-mL bottles and one 120-mL bottle were received as B18XR8 for semivolatile organic compound analysis (SVOA), polychlorinated biphenyl (PCB) analysis and inorganic and radionuclide analyses listed in the analytical instruction. The samples were described as dark brown, medium coarse sand.

Sample B190T9-A was collected and delivered to the laboratory on April 15, 2004. As received, it was labeled as B190T8 for a radscreen analysis. However, after receipt, the customer point of contact requested an additional isotopic plutonium analysis and requested that the results be reported using the sample number B190T8-A. The sample was described as dark brown, medium coarse sand.

SDG 222S20040100—This SDG consists of two customer samples numbered B17N64 and B17N68. These samples were collected and delivered to the laboratory on April 21, 2004. Sample B17N64 was received in five 40-mL amber bottles with septum lids for low-level VOC analysis only. Sample B17N68 was received in three 5-g En Core® samplers for high-level VOC analysis only. Sample B17N68 was described like the previous samples: dark brown, medium coarse sand.

For sample B17N64, three of the five bottles contained dark brown, medium coarse sand and the remaining two bottles contained lighter colored, beige, medium coarse sand. The initial low-level VOC analysis was performed using the first three of the bottles in numerical order and was reported as sample number S04M000115. The bottle chosen for the sample analysis contained the beige sand, while the bottles chosen for the matrix spike (MS) and matrix spike duplicate (MSD) analyses both contained the darker brown sand. The customer point of contact was informed of the discrepancy and an additional VOC analysis was requested on the remaining vial that contained darker sand. No additional MS or MSD analyses were performed. The sample results for the additional analysis are reported as sample B17N64-A (S04M000124), as the customer requested.

SDG 222S20040101—This SDG consists of one customer sample numbered B191Y4. The sample was collected and delivered to the laboratory on April 21, 2004. Five bottles were received for analysis; one 60-mL bottle was received for SVOA, one 500-mL bottle for radionuclide analysis, and three 40-mL amber glass bottles with septum lids for VOC analysis. On April 28, 2004, the customer point of contact canceled the request for SVOA and radionuclide analyses, and the 60-mL and 500-mL bottles were returned to the customer on April 29, 2004.

The 40-mL bottles were filled to the top with soil, leaving no head-space. No preservative was added to the sample bottles in the field. With the sample received in this configuration, it was unclear whether low-level or high-level VOC analysis was requested, so the chemist preserved portions of the sample for both analyses. The customer point of contact was informed of the decision made by the responsible chemist concerning the VOC, and requested the laboratory to report the high-level VOC analysis using sample number B191Y4-A.

3.0 SAMPLE HANDLING

Except for VOC analyses, the samples were stirred with a spatula prior to removing aliquots for analysis. With this type of sample, this method is typically not sufficient to achieve homogenization. However, the relative percent difference (RPD) between sample and duplicate results for most analytes meet the acceptance criteria listed in the analytical instructions, indicating good precision was obtained.

As noted in Section 2.0 for B191Y4, the sample was provided in three amber glass bottles with no preservative. Because the bottles had to be opened in a hood to obtain aliquots for analysis, the sample integrity was compromised and the results may be biased low.

4.0 HOLDING TIMES

The analytical instructions requested that the laboratory make every effort to meet the SW-846 (Reference 5 in the cover letter) holding times for VOA. Additionally, an e-mail message was received from the customer point of contact on April 19, 2004, requesting the laboratory to make every effort to meet all analytical holding times.

The holding times were met for all analyses except for pH, sulfide, and mercury (Hg) for sample B18XR8. For pH (24 hour) and sulfide (7 day), the holding times were not met because of an 8-day delay between the field sampling and delivery of the sample. For the Hg analysis, the 28-day holding time was not met because of a combination of the 8-day delay between sampling and delivery, and issues with scheduling resources and preparation of the fume hoods for the laboratory outage.

5.0 ANALYTICAL RESULTS

The Data Summary Report, included as Attachment 2, presents the analytical results for the requested analytes. In this table, solid samples that were prepared by water digest are indicated with a "W" in the aliquot class (A#) column, and an "S" indicates a distillation preparation was used. An "A" indicates an acid digest of a solid, and an "E" indicates that the stronger acid soil leach procedure was used to prepare the sample prior to analysis. If there is no letter identifier in this column, this indicates that the analysis was performed on a direct subsample with no separate preparation, or with sample preparation that was included as part of the analytical procedure steps.

Note that for most analytes, the results reported for the blank in the Data Summary Report are in the same units as indicated for the sample. However, for the ion chromatography (IC), inductively coupled plasma (ICP) spectroscopy, uranium by phosphorescence (total uranium), and ICP-mass spectrometry (ICP-MS) analyses, the results reported for the blank are actually µg/mL.

5.1 VOLATILE ORGANIC COMPOUND ANALYSIS ISSUES

Sample B18XW3 (S04M000096)—The concentration reported for carbon tetrachloride (CCl_4) exceeded the calibration range for the requested low-level VOC analysis. Therefore, the result of 260 µg/kg should be considered an estimate. Since the entire sample was used in process during the first analysis, no reanalysis was possible. Sample B18XR8 (S04M000095) was collected at the same time on the same day. This sample was submitted to the laboratory for high-level VOC analysis. No CCl_4 was detected in this sample at a detection limit of 240 µg/kg. For the high-level VOC analysis, some of the CCl_4 might have been lost due to the required process of opening the En Core® sampler to the atmosphere to transfer the sample to a vial for preserving.

Sample B17N64 (S04M000115)—The concentration reported for acetone exceeded the calibration range for the requested low-level VOC analysis. Therefore, the result of 170 µg/kg should be considered an estimate. Since the entire sample was used in process during the first analysis, no reanalysis was possible. Sample B17N68 (S04M000116) was collected at the same time on the same day. This sample was submitted to the laboratory for high-level VOC analysis. Acetone was detected at 660 µg/kg, but the result should be considered an estimate because it is less than the estimated quantitation limit (EQL), which is 10 times the reported detection limit. For the high-level VOC analysis, some of acetone might have been lost due to the required process of opening the En Core® sampler to the atmosphere to transfer the sample to a vial for preserving.

Sample B191Y4 (S04M000118)—The concentration reported for CCl_4 exceeded the calibration range for the aliquot that was preserved for low-level VOC analysis. Therefore, the result of 290 µg/kg should be considered an estimate. Since opening the sample vial greatly compromises low-level VOC analysis, no low-level reanalysis was requested. Sample B191Y4-A (S04M000123) was an aliquot removed from the same sample vial and preserved for high-level VOC analysis. For this analysis, CCl_4 was not detected at a detection limit of 130 µg/kg. Again, opening the vial may have compromised the analysis due to loss of analyte to the atmosphere. No reanalysis was requested.

6.0 QUALITY CONTROL RESULTS

6.1 LABORATORY CONTROL SAMPLES

For nonradionuclide analyses, the accuracy of the analysis was evaluated from the recovery of both a laboratory control sample (LCS) and an MS. The requested accuracy was LCS or MS within 70-130% recovery. For radionuclides, the accuracy of the gross (or total) alpha, gross (or total) beta, and ICP-MS analytes was evaluated from the LCS and MS recoveries. For all other radionuclide analyses, the accuracy was evaluated only from the LCS recovery. The requested radionuclide accuracy was LCS or MS within 80-120% recovery.

For the VOC analysis, a ketone mix containing acetone, 2-butanone, and 4-methyl-2-pentanone were part of the standard mix used for LCS analysis for sample B16N61 in addition to the requested set of compounds indicated in the letters from H. L. Anastos (References 3 and 4 in the cover letter). These compounds are part of the quality control (QC) protocol associated with an unrelated project. Although the LCS and MS recoveries for ketones were not required to be reported, they are included in the Data Summary Report (Attachment 2) for sample B17N61 only.

All LCS recoveries were acceptable in accordance with the analytical instructions and the 222-S Laboratory Quality Assurance Plan (QAPP-016) (Reference 1 in the cover letter).

6.2 METHOD AND PREPARATION BLANKS

For most analyses, no analytes were detected in the method or preparation blank. However, the following analytes were detected in the blanks prepared and analyzed with the samples.

a. Chromium (Cr) and lead (Pb) were detected in the acid digest blank analyzed with sample B18XR8. The level of Cr measured in the blank was about 60% of the concentration measured in the sample. The level Pb measured in the blank was about 10% of that measured in the sample. The sample was reprepared and reanalyzed and the reanalysis results confirmed that the original sample results were not affected by the contamination detected in the blank. The reanalysis was not reported because a larger sample size was used, which may have caused incomplete digestion of some analytes. This issue did not affect the comparison of the Cr and Pb results between the two digests.

b. Uranium (U) was detected in the blank that was prepared and analyzed with sample B18XR8 for total U. The level of U detected in the blank was about 9% of that detected in the sample. The reported results are considered estimates because they are less than 10 times the reported detection limit. They should also be considered biased high due to contamination. If the results are corrected for the high bias, they are confirmed by the sum of the U isotopes reported from the ICP-MS analysis. The sample was not reanalyzed because they were in agreement with the ICP-MS and because they would still be reported as estimates on a reanalysis due to the large dilution required to reduce matrix interference.

c. Thorium-232, ^{235}U, and ^{238}U were detected in the blank prepared and analyzed with sample B18XR8 by ICP-MS. For all three analytes, the level detected in the blank was considered insignificant because it was less than 5% of the concentration reported for the sample, as allowed by QAPP-016.

d. Beta activity was detected in the blank prepared and analyzed with sample B18XR8 for total beta. However, the contamination was considered insignificant because the blank activity was less than 5% of the activity in the sample, as allowed by QAPP-016.

e. Nitrite (NO_2) was detected in the water digest preparation blank analyzed with sample B18XR8. However, the contamination was considered insignificant because no NO_2 was detected in the sample.

f. Acetone was detected in the blanks analyzed with samples B18XR8 (S04M000095) (high-level VOC), B18XW3 (S04M000096) (low-level VOC), and B17N64-A (S04M000124) (low-level VOC). For sample B18XR8, no acetone was detected in the sample, so the blank contamination was considered insignificant. For sample B17N64-A, the blank result was less than the EQL and was considered insignificant. But for sample B18XW3, the acetone concentration reported for the blank was greater than the EQL and was about 20% of the sample concentration. For this sample, since the entire sample was used in process during the first analysis, no reanalysis was possible. Therefore, the acetone result should be considered biased high for B18XW3.

g. Low levels of 2-butanone were detected in the blanks analyzed with samples B18XW3 (S04M000096) (low-level VOC) and B17N64-A (S04M000124) (low-level VOC). In both instances, the blank result was less than the EQL and was considered insignificant.

6.3 DUPLICATE ANALYSES

One duplicate analysis was performed for each analyte for each SDG. The requested precision for analysis was an RPD ±20% for radionuclides and ±30% for all other methods. For VOC, SVOA, and PCB analyzed, the analysis precision was determined by calculating the RPD between an MS and MSD. These are discussed in Section 6.4.

In addition to the RPDs requested in the analytical instructions, QAPP-016 states that the RPD criterion is not applicable when the sample results are less than 10 times the reported detection limit for nonradionuclide analyses or if the counting uncertainty is greater than 15% for radionuclide analyses. Although total U and Cl had RPDs greater than 30% and ^{233}U and ^{234}U had RPDs greater than 20%, the sample results were all less than 10 times the reported detection limits. For ^{90}Sr, the RPD was also greater than 20%, but the counting uncertainty was greater than 15%. All other analyte results met RPD criteria stated in the analytical instruction.

6.4 MATRIX SPIKE AND MATRIX SPIKE DUPLICATE

Where applicable, one MS sample was analyzed for each analyte for each SDG. For the VOC analysis, the samples were batched based on when they were received. High-level and low-level samples were analyzed in separate batches. One MS and one MSD was analyzed for each analytical batch. The SDGs were batched as indicated below.

a. Batch 1 — Low-level batch:
SDG 222S20040061 only - B17N61 (S04M000022) was the only sample in this batch; MS and MSD analyzed with this sample.

b. Batch 2 — High-level batch:
SDG 222S20040073 only – B18XR8 (S04M000095) was the only high-level sample in this batch; MS and MSD analyzed with this sample.

c. Batch 3 — Low-level batch:
SDG 222S20040073 only – B18XW3 (S04M000096) was the only low-level sample in this batch; MS and MSD analyzed with this sample.

d. Batch 4 — Low-level batch:
SDG 222S20040100 – B17N64 (S04M000115); MS and MSD analyzed with this sample.
SDG 222S20040101 – B191Y4 (S04M000118); no additional QC run with this sample.

e. Batch 5 — Low-level batch:
SDG 222S20040100 – B17N64-A (S04M000124); this was an additional analysis request for this sample based on variation of colors of the soil in the five vials received. There were insufficient vials available to provide additional QC for this sample.

f. Batch 6 High-level batch:
SDG 222S20040100 – B17N68 (S04M000116); MS and MSD analyzed with this sample.
SDG222S20040101 –B191Y4-A (S04M000123); no additional QC run with this sample.

For nonradionuclide analyses, the accuracy of the analysis was evaluated from both the LCS and MS recoveries. The requested accuracy was LCS or MS within 70-130% recovery. An MS analysis was not applicable for the pH analysis. For the SVOA and VOC analyses, the analytical instructions requested that the laboratory report MS recoveries only for the representative set of compounds indicated in the letters from H. L. Anastos (References 3 and 4 in the cover letter). For PCB analysis, only Aroclor-1254 is included in the MS because it is the aroclor most commonly detected in samples on the Hanford site. All analytes met the accuracy criterion stated in the analytical instructions.

In addition to the MS analysis, an MSD was analyzed with the SVOA, VOC, and PCB analyses to evaluate method precision. The spike RPD between the MS and MSD met the precision criterion for all analyses.

For the VOC analysis, a ketone mix containing acetone, 2-butanone, and 4-methyl-2-pentanone were part of the standard mix used for MS analysis for sample B17N61 in addition to those compounds listed in the Anastos letters. These compounds are part of the QC protocol associated with an unrelated project. Although the ketones were not required to be reported, they are included in the Data Summary Report for B17N61 only, but they are not included in the MS/MSD evaluation.

For radionuclides, the accuracy of the gross (or total) alpha, gross (or total) beta, and ICP-MS analytes was evaluated from the LCS and MS recoveries. For all other radionuclide analyses, the accuracy was evaluated only from the LCS, which is discussed in Section 6.1. The requested radionuclide accuracy was LCS or MS within 80-120% recovery. All analytes met the accuracy criterion stated in the analytical instructions.

The Data Summary Report included as Attachment 2 does not report the recoveries for the MSD analysis or the RPD for the MS/MSD analysis. This information is provided in Table 1 through Table 5 for VOA, Table 6 for SVOA, and Table 7 for PCB analysis.

Table 1. MS/MSD Recoveries and RPD for VOA for B17N61.

Compound	MS (%)	MSD (%)	RPD (%)
Benzene	88	88	0
Chlorobenzene	90	88	2
1,1-Dichloroethene	70	75	7
Toluene	87	86	1
Trichloroethene	88	88	0

Table 2. MS/MSD Recoveries and RPD for VOA for B18XW3.

Compound	MS (%)	MSD (%)	RPD (%)
Benzene	101	102	1
Chlorobenzene	99	101	2
1,1-Dichloroethene	94	93	1
Toluene	95	98	3
Trichloroethene	102	102	0

Table 3. MS/MSD Recoveries and RPD for VOA for B18XR8.

Compound	MS (%)	MSD (%)	RPD (%)
Benzene	91	91	0
Chlorobenzene	91	91	0
1,1-Dichloroethene	92	106	14
Toluene	89	89	0
Trichloroethene	89	88	1

Table 4. MS/MSD Recoveries and RPD for VOA for B17N64.

Compound	MS (%)	MSD (%)	RPD (%)
Benzene	102	103	1
Chlorobenzene	100	100	0
1,1-Dichloroethene	94	92	2
Toluene	94	94	0
Trichloroethene	100	102	2

Table 5. MS/MSD Recoveries and RPD for VOA for B17N68.

Compound	MS (%)	MSD (%)	RPD (%)
Benzene	99	109	10
Chlorobenzene	109	114	4
1,1-Dichloroethene	85	84	1
Toluene	106	117	10
Trichloroethene	91	96	5

Table 6. MS/MSD Recoveries and RPD for SVOA for B18XR8.

Compound	MS (%)	MSD (%)	RPD (%)
Phenol	87	92	6
2-Chlorophenol	81	84	4
1,4-Dichlorobenzene	75	83	10
N-Nitroso-di-n-propylamine	82	88	7
1,2,4-Trichlorobenzene	83	90	8
4-Chloro-3-methylphenol	85	88	3
Acenaphthene	87	92	6
4-Nitrophenol	86	89	3
2,4-Dinitrotoluene	80	85	6
Pentachlorophenol	72	76	5
Pyrene	79	86	8

Table 7. MS/MSD Recoveries and RPD for PCB for B18XR8.

Compound	MS (%)	MSD (%)	RPD (%)
Aroclor 1254	86	87	1

6.5 SURROGATE RECOVERIES

Surrogate standards are added to all field and QC samples for VOC, SVOA, and PCB analyses. The surrogate is added to monitor total method recovery through preparation, sample matrix cleanup, and analysis. All surrogate standard recoveries met the requirements in QAPP-016.

6.6 OPPORTUNISTIC ANALYTES

The VOC analysis contains results for compounds that were calibrated for in the method but were not requested in the analytical instructions. These results are considered "opportunistic" rather than tentatively identified compounds (TIC) because the results are more accurate. The calculated results, chemical abstract system (CAS) numbers, and method detection limits (MDL) for these compounds are presented in Table 8. The MDLs are included in parentheses after the sample results. Results that should be considered estimated because the concentration was not greater than 10 times the MDL are indicated with a (J) and those that are estimated because the concentration exceeded the calibration range are indicated with an (E).

Table 8. Opportunistic Compound Results for VOC.

Compound	CAS#	Units	B191G	B191G2	B191G3	B191G-A	B191Y2-A	B191Y4
n-Butanol	71-36-3	µg/kg	260 (25)	1500 (20) (E)	ND	301 (19)	ND	947 (22) (E)
Tetrahydrofuran	109-99-9	µg/kg	9.6 (2.2) (J)	112 (1.8)	93 (2.4)	36 (1.7)	ND	51 (2.0)
2-Hexanone	591-78-6	µg/kg	ND	1.3 (0.6) (J)	1.3 (0.8) (J)	7.6 (0.6)	ND	1.5 (0.6) (J)
2-Pentanone	107-87-9	µg/kg	ND	ND	6.6 (2.4) (J)	6.0 (1.7) (J)	ND	ND
Carbon disulfide	75-15-0	µg/kg	ND	ND	ND	ND	ND	11 (0.9)
Styrene	100-42-5	µg/kg	ND	ND	ND	ND	ND	2.9 (0.7) (J)
1,2-Dibromo-3-chloropropane	96-12-8	µg/kg	ND	ND	ND	ND	ND	588 (75) (J)

ND—Not detected.

For sample B17N61 (S04M000022), three opportunistic VOC compounds were reported in the preliminary report as detected in the sample. However, further examination of the data determined that methyl acetate was detected in most of the blanks, LCS, and samples. Therefore, that compound was considered to be contamination from an unknown source and not related to the sample matrix. The result is not included in this section of the report.

6.7 TENTATIVELY IDENTIFIED COMPOUNDS

The analytical instructions (Reference 2) list five compounds for VOC analysis that the laboratory does not routinely report, as indicated in the letter from H. L. Anastos (Reference 4). The laboratory was requested to perform a TIC search for these compounds. These compounds were not detected in any of the samples.

Several other TICs were identified in the samples. The TICs are identified by the instrument library search based only on masses in the spectra and are not based on retention times or verified with independent check standards. These compounds could be misidentified because of matrix effects. The concentrations are estimated based only on the nearest internal standard and a presumed response factor of 1. The TIC results are presented in Table 9.

For sample B17N61 (S04M000022), the preliminary report indicated that three TICs were identified during the VOC analysis. However, further examination of the data determined that cyclotetrasiloxane, octamethyl was detected in most of the blanks, LCS, and samples. Therefore, that compound was considered to be contamination from an unknown source and not related to the sample matrix. The result is not included in this section of the report.

6.8 TARGET QUANTITATION LIMITS

The analytical instructions listed target quantitation limits (TQL) for each requested analyte except mercury. The Data Summary Report provides MDLs. These must be converted to EQL to compare these to the requested TQLs. For all of the inorganic methods, the EQL is calculated as 10 times the reported MDL. The radionuclide analyses use several different conversion factors for determining the EQL. For gamma energy analysis (GEA) and ^{237}Np, the EQL is five times the reported MDL. For total alpha, total beta and ^{90}Sr, the EQL is three times the reported MDL. For the determination of isotopic plutonium and americium by alpha energy analysis, the MDL is the EQL.

The laboratory was unable to meet all of the requested TQLs due to necessary dilutions of the samples. These dilutions ensured analyte concentrations did not exceed calibration ranges and avoided contamination and carry-over problems. For radionuclide analysis, sample sizes were chosen based on allowable activity in a sample that is allowed in the counting room, or level of activity compared to the standard amount of tracer added, or a sample size limit in the procedure. The laboratory used the largest feasible sample sizes to obtain the lowest detection limits possible for these analyses.

Table 9. Tentatively Identified Compounds from VOC Analysis.

Compound	CAS#	Units	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2-Propanol, 2-methyl- (tert-butanol)	75-65-0	µg/kg	4.3	ND	ND	ND	ND
1-Hexanol, 2-ethyl	104-76-7	µg/kg	8.5	ND	ND	ND	ND
Butanal	123-72-8	µg/kg	ND	18	ND	ND	ND
Methane, nitro	75-52-5	µg/kg	ND	5.5	ND	ND	ND
2,5-Cyclohexadiene-1,4-dione, 2,6-bis(1,1-dimethylethyl)-	719-22-2	µg/kg	ND	4.5	6.2	ND	ND
1-Hexanol, 2-ethyl	104-76-7	µg/kg	ND	24	ND	12	ND
Ethane, hexachloro	67-72-1	µg/kg	ND	5.2	ND	15	ND
Isopropyl alcohol	67-63-0	µg/kg	ND	ND	ND	ND	10
Pentanal	110-62-3	µg/kg	ND	ND	ND	8.9	ND
Hexanal	66-25-1	µg/kg	ND	ND	ND	13	ND
Ethene, tribromo	598-16-3	µg/kg	ND	ND	ND	5.7	ND
Benzoic acid, 2-[(trimethylsilyl)oxy]-, trimethylsilyl ester	3789-85-3	µg/kg	ND	ND	ND	ND	6.3

ND—Not detected.

7.0 ANALYTICAL PROCEDURES

Table 10 presents the 222-S Laboratory analytical procedures used to generate the reported results.

Table 10. Analytical Procedures.

Analysis	Preparation Procedure	Analysis Procedure
Inorganic Analyses		
pH	Direct	LA-212-105 Rev. D-0
Hg	Direct	LA-325-106 Rev. C-0
CN	Direct	LA-695-102 Rev. I-2
NH4	Distillation	LA-533-101 Rev. K-0
IC	Water digest	LA-533-107 Rev. C-2
Sulfide	Direct	LA-361-101 Rev. A-2
Total U	Acid digest	LA-925-009 Rev. D-5
ICP	Acid digest	LA-505-161 Rev. D-1
ICP-MS	Acid digest	LA-506-102 Rev. A-0
Radionuclide Analyses		
Total alpha/total beta	Environmental digest	LA-508-101 Rev. I-1
GEA	Environmental digest	LA-548-121 Rev. F-5
^{90}Sr	Environmental digest	LA-220-103 Rev. F-10
^{237}Np	Environmental digest	LA-933-141 Rev. H-7
^{238}Pu, $^{239/240}Pu$	Environmental digest	LA-953-104 Rev. D-1
^{241}Am	Environmental digest	LA-953-104 Rev. D-1
Organic Analyses		
VOA	Direct	LA-523-118 Rev. A-2
SVOA	Organic extraction	LA-523-135 Rev. A-2
PCB	Organic extraction	LA-523-140 Rev. B-0

Notes:
Acid digest procedure: LA-505-163 Rev. D-2
Water digest procedure: LA-504-101 Rev. I-0
Distillation procedure: LA-544-112 Rev. A-1
Environmental acid digest procedure: LA-544-101 Rev. C-5
Organic extraction procedure: LA-523-138 Rev. D-0

CH2M-0401824

Attachment 2

DATA SUMMARY REPORT

Consisting of 12 pages, including coversheet

Attachment 2
Z9 TRENCH4

CORE NUMBER: 222S20040061
SEGMENT #: B17N61

SEGMENT PORTION: VOA

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000022			Vinyl Chloride	ug/Kg	n/a	<1.5	<1.7	n/a	n/a	n/a	n/a	2	n/a
S04M000022			Chloromethane	ug/Kg	n/a	<1.6	<1.8	n/a	n/a	n/a	n/a	2	n/a
S04M000022			Methylene Chloride	ug/Kg	n/a	<1.3	<1.4	n/a	n/a	n/a	n/a	1	n/a
S04M000022			Acetone	ug/Kg	1.1e+02	<0.92	26	n/a	n/a	n/a	1.1e+02	1	n/a
S04M000022			1,1-Dichloroethane	ug/Kg	n/a	<0.80	<0.88	n/a	n/a	n/a	n/a	0.9	n/a
S04M000022			1,2-Dichloroethene (cis & tran	ug/Kg	n/a	<1.4	<1.5	n/a	n/a	n/a	n/a	1	n/a
S04M000022			Chloroform	ug/Kg	n/a	<0.72	0.96	n/a	n/a	n/a	n/a	0.8	n/a
S04M000022			1,2-Dichloroethane	ug/Kg	n/a	<0.76	<0.84	n/a	n/a	n/a	n/a	0.8	n/a
S04M000022			2-Butanone	ug/Kg	1.1e+02	<0.82	36	n/a	n/a	n/a	1.0e+02	0.9	n/a
S04M000022			1,1,1-Trichloroethane	ug/Kg	n/a	<0.70	<0.77	n/a	n/a	n/a	n/a	0.8	n/a
S04M000022			Carbon Tetrachloride	ug/Kg	n/a	<1.3	19	n/a	n/a	n/a	n/a	1	n/a
S04M000022			Trichloroethene	ug/Kg	90	<0.86	<0.95	n/a	n/a	n/a	88	0.9	n/a
S04M000022			Benzene	ug/Kg	88	<0.66	<0.73	n/a	n/a	n/a	88	0.7	n/a
S04M000022			4-Methyl-2-pentanone	ug/Kg	1.0e+02	<0.74	<0.82	n/a	n/a	n/a	1.0e+02	0.8	n/a
S04M000022			Tetrachloroethene	ug/Kg	n/a	<0.70	<0.77	n/a	n/a	n/a	n/a	0.8	n/a
S04M000022			Toluene	ug/Kg	86	<0.64	<0.71	n/a	n/a	n/a	87	0.7	n/a
S04M000022			Chlorobenzene	ug/Kg	91	<0.76	<0.84	n/a	n/a	n/a	90	0.8	n/a
S04M000022			Ethylbenzene	ug/Kg	n/a	<0.98	<1.1	n/a	n/a	n/a	n/a	1	n/a
S04M000022			Xylenes (total)	ug/Kg	n/a	<1.6	<1.8	n/a	n/a	n/a	n/a	2	n/a
S04M000022			1,1-Dichloroethene	ug/Kg	73	<0.76	<0.84	n/a	n/a	n/a	70	0.8	n/a

Attachment 2
Z9 TRENCH5
Data Summary Report

CORE NUMBER: 222S20040073
SEGMENT #: B18XR8

SEGMENT PORTION: Acid Digest

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000103		A	Silver -ICP-Acid Digest	ug/g	95.8	<4.00e-03	<0.743	0.924	n/a	n/a	94.5	0.74	n/a
S04M000103		A	Arsenic -ICP-Acid Digest	ug/g	113	<0.0514	<9.55	<9.63	n/a	n/a	111	9.6	n/a
S04M000103		A	Barium -ICP-Acid Digest	ug/g	97.8	<7.30e-03	43.4	46.7	45.1	7.42	96.9	1.4	n/a
S04M000103		A	Beryllium -ICP-Acid Digest	ug/g	103	<7.70e-03	<1.43	<1.44	n/a	n/a	102	1.4	n/a
S04M000103		A	Bismuth -ICP-Acid Digest	ug/g	94.9	<0.0508	<9.44	<9.52	n/a	n/a	94.6	9.4	n/a
S04M000103		A	Cadmium -ICP-Acid Digest	ug/g	94.6	<4.20e-03	11.7	13.0	12.4	10.5	92.4	0.78	n/a
S04M000103		A	Chromium -ICP-Acid Digest	ug/g	97.3	0.0496	15.5	15.1	15.3	2.34	95.5	2.7	n/a
S04M000103		A	Copper -ICP-Acid Digest	ug/g	97.6	<7.90e-03	13.2	13.7	13.4	3.63	96.4	1.5	n/a
S04M000103		A	Lithium -ICP-Acid Digest	ug/g	100	<8.10e-03	10.4	11.3	10.8	8.29	99.6	1.5	n/a
S04M000103		A	Manganese -ICP-Acid Digest	ug/g	95.5	<3.40e-03	310	336	323	8.22	95.9	0.63	n/a
S04M000103		A	Nickel -ICP-Acid Digest	ug/g	97.4	0.0142	25.4	27.4	26.4	7.45	94.5	2.3	n/a
S04M000103		A	Phosphorus -ICP-Acid Digest	ug/g	95.9	<0.0556	533	557	545	4.26	98.8	10	n/a
S04M000103		A	Lead -ICP-Acid Digest	ug/g	91.4	<0.0246	5.76	7.11	6.44	20.9	89.8	4.6	n/a
S04M000103		A	Antimony -ICP-Acid Digest	ug/g	93.3	<0.0502	<9.32	<9.41	n/a	n/a	79.5	9.3	n/a
S04M000103		A	Selenium -ICP-Acid Digest	ug/g	96.8	<0.0494	<9.18	<9.26	n/a	n/a	96.4	9.2	n/a
S04M000103		A	Strontium -ICP-Acid Digest	ug/g	99.6	<3.30e-03	15.2	17.3	16.3	13.0	98.4	0.61	n/a
S04M000103		A	Zinc -ICP-Acid Digest	ug/g	92.3	<6.90e-03	42.3	42.6	42.4	0.808	91.3	1.3	n/a

SEGMENT PORTION: Environmental Acid Digest

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000104		E	Uranium by Phosphorescence	ug/g	94.8	5.66e-03	1.22	1.66	1.44	30.6	80.4	0.83	n/a
S04M000104		E	Pu-239/240 by TRU-SPEC Resin	uCi/g	90.9	<1.22e-04	2.26e-03	2.61e-03	2.44e-03	14.4	n/a	1.3e-04	2.0
S04M000104		E	Pu-238 by TRU-SPEC Resin IonEx	uCi/g	n/a	<1.31e-04	6.57e-04	5.45e-04	6.01e-04	18.6	n/a	1.4e-04	2.8
S04M000104		E	Np237 by TTA Extraction	uCi/g	103	<2.34e-05	2.89e-05	2.45e-05	2.67e-05	16.5	n/a	3.8e-05	80
S04M000104		E	Thorium-232 by ICP/MS	ug/g	103	0.319	6.36	5.71	6.04	10.7	94.2	9.6e-04	n/a
S04M000104		E	Uranium-233 by ICP/MS Acid Dig	ug/g	n/a	<3.60e-03	3.24e-04	2.53e-04	2.88e-04	24.5	n/a	7.2e-05	n/a
S04M000104		E	Uranium-234 by ICP/MS Acid Dig	ug/g	n/a	<1.20e-03	6.78e-05	5.44e-05	6.11e-05	22.0	n/a	2.4e-05	n/a
S04M000104		E	Uranium-235 by ICP/MS Acid Dig	ug/g	99.9	9.74e-03	6.79e-03	6.44e-03	6.62e-03	5.39	109	8.8e-05	n/a
S04M000104		E	Uranium-238 by ICP/MS Acid Dig	ug/g	101	1.38	0.922	0.910	0.916	1.35	98.5	4.4e-03	n/a
S04M000104		E	Cobalt-60 by GEA	uCi/g	103	<1.37e-05	<1.53e-05	<1.37e-05	n/a	n/a	n/a	1.5e-05	n/a
S04M000104		E	Antimony-125 by GEA	uCi/g	n/a	<3.69e-05	<3.47e-05	<3.75e-05	n/a	n/a	n/a	3.5e-05	n/a
S04M000104		E	Cesium-134 by GEA	uCi/g	n/a	<1.10e-05	<1.25e-05	<1.20e-05	n/a	n/a	n/a	1.3e-05	n/a
S04M000104		E	Cesium-137 by GEA	uCi/g	108	7.09e-05	<2.61e-05	<2.54e-05	n/a	n/a	n/a	2.6e-05	n/a
S04M000104		E	Europium-152 by GEA	uCi/g	n/a	<1.96e-05	<2.07e-05	<2.12e-05	n/a	n/a	n/a	2.1e-05	n/a
S04M000104		E	Europium-154 by GEA	uCi/g	n/a	<4.87e-05	<4.40e-05	<4.77e-05	n/a	n/a	n/a	4.4e-05	n/a
S04M000104		E	Europium-155 by GEA	uCi/g	n/a	<1.68e-05	<2.06e-05	<2.11e-05	n/a	n/a	n/a	2.1e-05	n/a
S04M000104		E	Am-241 by TRU-SPEC Resin IonEx	uCi/g	104	<0.0166	0.309	0.299	0.304	3.29	n/a	0.032	2.3
S04M000104		E	Alpha Env: Solids/Miscs	uCi/g	100	<6.51e-05	0.296	0.279	0.288	5.91	85.8	1.5e-04	1.2
S04M000104		E	Beta in Env. Solids/Misc	uCi/g	109	1.84e-03	0.0548	0.0509	0.0528	7.38	108	4.2e-04	2.4
S04M000228		E	Sr-89/90 Env. Solids	uCi/g	101	<4.05e-07	7.41e-07	5.08e-07	6.24e-07	37.3	n/a	7.9e-07	82

SEGMENT PORTION: NH4 Distillation

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000105		S	Ammonium Ion-IC-Dionex 100	ug/g	103	<0.100	192	161	177	17.8	83.6	1.1e+02	n/a

SEGMENT PORTION: PCB

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000107			Aroclor-1016WET by SW-846 8082	ug/Kg	n/a	<16	<39	n/a	n/a	n/a	n/a	4.e+01	n/a
S04M000107			Aroclor-1221WET by SW-846 8082	ug/Kg	n/a	<5.2	<12	n/a	n/a	n/a	n/a	1.e+01	n/a
S04M000107			Aroclor-1232WET by SW-846 8082	ug/Kg	n/a	<92	<2.2e+02	n/a	n/a	n/a	n/a	2.e+02	n/a
S04M000107			Aroclor-1242WET by SW-846 8082	ug/Kg	n/a	<17	<40	n/a	n/a	n/a	n/a	4.e+01	n/a
S04M000107			Aroclor-1248WET by SW-846 8082	ug/Kg	n/a	<5.3	<13	n/a	n/a	n/a	n/a	1.e+01	n/a
S04M000107			Aroclor-1254WET by SW-846 8082	ug/Kg	84	<3.1	<7.4	n/a	n/a	n/a	86	7	n/a
S04M000107			Aroclor-1260WET by SW-846 8082	ug/Kg	n/a	<23	<54	n/a	n/a	n/a	n/a	5.e+01	n/a

SEGMENT PORTION: Parent

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000101			Cyanide Water Distillation	ug/g	102	<0.550	<0.451	<0.405	n/a	n/a	99.0	0.45	n/a
S04M000101			Mercury by CVAA (PE) with FIAS	ug/g	104	<1.00e-04	0.0900	0.0960	0.0930	6.45	98.0	0.040	n/a
S04M000101			pH on Solid Samples	pH	n/a	n/a	5.97	5.99	5.98	0.334	n/a	0.010	n/a
S04M000101			Sulfide by Microdist. & ISE	ug/g	90.7	<0.158	<14.6	14.6	n/a	n/a	87.2	15	n/a

SEGMENT PORTION: SVOA

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000106			Pentachlorophenol	ug/Kg	74	<4.0e+02	<9.6e+02	n/a	n/a	n/a	72	1.e+03	n/a
S04M000106			Phenol	ug/Kg	86	<4.0e+02	<9.6e+02	n/a	n/a	n/a	87	1.e+03	n/a
S04M000106			2-Chlorophenol	ug/Kg	80	<4.0e+02	<9.6e+02	n/a	n/a	n/a	81	1.e+03	n/a
S04M000106			Pyrene	ug/Kg	91	<4.0e+02	<9.6e+02	n/a	n/a	n/a	79	1.e+03	n/a
S04M000106			N-Nitroso-di-n-propylamine	ug/Kg	86	<4.0e+02	<9.6e+02	n/a	n/a	n/a	82	1.e+03	n/a
S04M000106			1,2,4-Trichlorobenzene SV	ug/Kg	89	<4.0e+02	<9.6e+02	n/a	n/a	n/a	83	1.e+03	n/a
S04M000106			4-Chloro-3-methylphenol	ug/Kg	85	<4.0e+02	<9.6e+02	n/a	n/a	n/a	85	1.e+03	n/a
S04M000106			Acenaphthene	ug/Kg	94	<4.0e+02	<9.6e+02	n/a	n/a	n/a	88	1.e+03	n/a
S04M000106			4-Nitrophenol	ug/Kg	83	<4.0e+02	<9.6e+02	n/a	n/a	n/a	86	1.e+03	n/a
S04M000106			2,4-Dinitrotoluene	ug/Kg	85	<4.0e+02	<9.6e+02	n/a	n/a	n/a	81	1.e+03	n/a
S04M000106			2-Methylphenol	ug/Kg	n/a	<4.0e+02	<9.6e+02	n/a	n/a	n/a	n/a	1.e+03	n/a
S04M000106			3 & 4 Methylphenol Total	ug/Kg	n/a	<4.0e+02	<9.6e+02	n/a	n/a	n/a	n/a	1.e+03	n/a
S04M000106			1,4-Dichlorobenzene	ug/Kg	84	<4.0e+02	<9.6e+02	n/a	n/a	n/a	75	1.e+03	n/a
S04M000106			Tri-n-butylphosphate	ug/Kg	n/a	<4.0e+02	<9.6e+02	n/a	n/a	n/a	n/a	1.e+03	n/a

SEGMENT PORTION: VOA

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000095			Vinyl Chloride	ug/Kg	n/a	<6.0e+02	<5.6e+02	n/a	n/a	n/a	n/a	6.e+02	n/a
S04M000095			Chloromethane	ug/Kg	n/a	<6.6e+02	<6.2e+02	n/a	n/a	n/a	n/a	6.e+02	n/a
S04M000095			Methylene Chloride	ug/Kg	n/a	<2.5e+02	<2.4e+02	n/a	n/a	n/a	n/a	2.e+02	n/a
S04M000095			Acetone	ug/Kg	n/a	8.5e+02	<1.7e+02	n/a	n/a	n/a	n/a	2.e+02	n/a
S04M000095			1,1-Dichloroethane	ug/Kg	n/a	<3.2e+02	<3.0e+02	n/a	n/a	n/a	n/a	3.e+02	n/a
S04M000095			1,2-Dichloroethene (cis & tran	ug/Kg	n/a	<2.8e+02	<2.6e+02	n/a	n/a	n/a	n/a	3.e+02	n/a
S04M000095			Chloroform	ug/Kg	n/a	<1.4e+02	<1.4e+02	n/a	n/a	n/a	n/a	1.e+02	n/a

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000095			1,2-Dichloroethane	ug/Kg	n/a	<1.5e+02	<1.4e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000095			2-Butanone	ug/Kg	n/a	<1.6e+02	<1.5e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000095			1,1,1-Trichloroethane	ug/Kg	n/a	<1.4e+02	<1.3e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000095			Carbon Tetrachloride	ug/Kg	n/a	<2.6e+02	<2.4e+02	n/a	n/a	n/a	n/a	2.e+02	n/a
S04M000095			Trichloroethene	ug/Kg	1.0e+02	<1.7e+02	<1.6e+02	n/a	n/a	n/a	89	2.e+02	n/a
S04M000095			Benzene	ug/Kg	1.0e+02	<1.3e+02	<1.2e+02	n/a	n/a	n/a	91	1.e+02	n/a
S04M000095			4-Methyl-2-pentanone	ug/Kg	n/a	<1.5e+02	<1.4e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000095			Tetrachloroethene	ug/Kg	n/a	<1.4e+02	<1.3e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000095			Toluene	ug/Kg	96	<1.3e+02	<1.2e+02	n/a	n/a	n/a	89	1.e+02	n/a
S04M000095			Chlorobenzene	ug/Kg	1.0e+02	<1.5e+02	<1.4e+02	n/a	n/a	n/a	91	1.e+02	n/a
S04M000095			Ethylbenzene	ug/Kg	n/a	<2.0e+02	<1.8e+02	n/a	n/a	n/a	n/a	2.e+02	n/a
S04M000095			Xylenes (total)	ug/Kg	n/a	<3.2e+02	<3.0e+02	n/a	n/a	n/a	n/a	3.e+02	n/a
S04M000095			1,1-Dichloroethene	ug/Kg	1.2e+02	<1.5e+02	<1.4e+02	n/a	n/a	n/a	92	1.e+02	n/a

SEGMENT PORTION: Water Digest

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000102		W	Fluoride IC SW846	ug/g	97.6	<0.0120	<24.9	<24.7	n/a	n/a	102	25	n/a
S04M000102		W	Chloride SW-846	ug/g	94.0	<0.0170	39.7	61.7	50.7	43.5	95.2	35	n/a
S04M000102		W	Nitrite IC SW846	ug/g	96.0	0.130	<224	<222	n/a	n/a	96.4	2.2e+02	n/a
S04M000102		W	Nitrate by IC SW846	ug/g	98.4	<0.139	5.91e+03	6.26e+03	6.09e+03	5.75	101	2.9e+02	n/a
S04M000102		W	Phosphate by IC SW846	ug/g	98.5	<0.120	<249	<247	n/a	n/a	98.3	2.5e+02	n/a
S04M000102		W	Sulfate by IC SW846	ug/g	95.8	<0.138	<287	<284	n/a	n/a	97.8	2.9e+02	n/a

Attachment 2
Z9 TRENCH5
Data Summary Report

CORE NUMBER: 222S20040073
SEGMENT #: B18XW3

SEGMENT PORTION: VOA

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000096			Vinyl Chloride	ug/Kg	n/a	<1.5	<1.3	n/a	n/a	n/a	n/a	1	n/a
S04M000096			Chloromethane	ug/Kg	n/a	<1.6	<1.5	n/a	n/a	n/a	n/a	1	n/a
S04M000096			Methylene Chloride	ug/Kg	n/a	<1.3	<1.1	n/a	n/a	n/a	n/a	1	n/a
S04M000096			Acetone	ug/Kg	n/a	10	51	n/a	n/a	n/a	n/a	0.8	n/a
S04M000096			1,1-Dichloroethane	ug/Kg	n/a	<0.80	<0.72	n/a	n/a	n/a	n/a	0.7	n/a
S04M000096			1,2-Dichloroethene (cis & tran	ug/Kg	n/a	<1.4	<1.2	n/a	n/a	n/a	n/a	1	n/a
S04M000096			Chloroform	ug/Kg	n/a	<0.72	15	n/a	n/a	n/a	n/a	0.6	n/a
S04M000096			1,2-Dichloroethane	ug/Kg	n/a	<0.76	<0.68	n/a	n/a	n/a	n/a	0.7	n/a
S04M000096			2-Butanone	ug/Kg	n/a	0.94	27	n/a	n/a	n/a	n/a	0.7	n/a
S04M000096			1,1,1-Trichloroethane	ug/Kg	n/a	<0.70	<0.63	n/a	n/a	n/a	n/a	0.6	n/a
S04M000096			Carbon Tetrachloride	ug/Kg	n/a	<1.3	2.6e+02	n/a	n/a	n/a	n/a	1	n/a
S04M000096			Trichloroethene	ug/Kg	1.0e+02	<0.86	<0.77	n/a	n/a	n/a	1.0e+02	0.8	n/a
S04M000096			Benzene	ug/Kg	1.0e+02	<0.66	<0.59	n/a	n/a	n/a	1.0e+02	0.6	n/a
S04M000096			4-Methyl-2-pentanone	ug/Kg	n/a	<0.74	<0.66	n/a	n/a	n/a	n/a	0.7	n/a
S04M000096			Tetrachloroethene	ug/Kg	n/a	<0.70	0.94	n/a	n/a	n/a	n/a	0.6	n/a
S04M000096			Toluene	ug/Kg	96	<0.64	<0.57	n/a	n/a	n/a	95	0.6	n/a
S04M000096			Chlorobenzene	ug/Kg	1.0e+02	<0.76	<0.68	n/a	n/a	n/a	99	0.7	n/a
S04M000096			Ethylbenzene	ug/Kg	n/a	<0.98	<0.88	n/a	n/a	n/a	n/a	0.9	n/a
S04M000096			Xylenes (total)	ug/Kg	n/a	<1.6	<1.4	n/a	n/a	n/a	n/a	1	n/a
S04M000096			1,1-Dichloroethene	ug/Kg	97	<0.76	<0.68	n/a	n/a	n/a	94	0.7	n/a

Attachment 2
Z9 TRENCH5
Data Summary Report

CORE NUMBER: 222S20040073
SEGMENT #: B190T8-A DAyres 6/23/04

SEGMENT PORTION: Environmental Acid Digest

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000108		E	Pu-239/240 by TRU-SPEC Resin	uCi/g	111	<1.26e-03	4.99e-03	5.79e-03	5.39e-03	14.8	n/a	1.3e-03	4.4
S04M000108		E	Pu-238 by TRU-SPEC Resin IonEx	uCi/g	n/a	<1.46e-03	<1.48e-03	<1.86e-03	n/a	n/a	n/a	1.5e-03	1.0e+02

Attachment 2
Z9 TRENCH5
Data Summary Report

CORE NUMBER: 222S20040100
SEGMENT #: B17N64

SEGMENT PORTION: VOA

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000115			Vinyl Chloride	ug/Kg	n/a	<1.5	<1.8	n/a	n/a	n/a	n/a	2	n/a
S04M000115			Chloromethane	ug/Kg	n/a	<1.6	<2.0	n/a	n/a	n/a	n/a	2	n/a
S04M000115			Methylene Chloride	ug/Kg	n/a	<1.3	<1.5	n/a	n/a	n/a	n/a	1	n/a
S04M000115			Acetone	ug/Kg	n/a	<0.92	1.7e+02	n/a	n/a	n/a	n/a	1	n/a
S04M000115			1,1-Dichloroethane	ug/Kg	n/a	<0.80	<0.96	n/a	n/a	n/a	n/a	1	n/a
S04M000115			1,2-Dichloroethene (cis & tran	ug/Kg	n/a	<1.4	<1.6	n/a	n/a	n/a	n/a	2	n/a
S04M000115			Chloroform	ug/Kg	n/a	<0.72	8.7	n/a	n/a	n/a	n/a	0.9	n/a
S04M000115			1,2-Dichloroethane	ug/Kg	n/a	<0.76	<0.91	n/a	n/a	n/a	n/a	0.9	n/a
S04M000115			2-Butanone	ug/Kg	n/a	<0.82	75	n/a	n/a	n/a	n/a	1	n/a
S04M000115			1,1,1-Trichloroethane	ug/Kg	n/a	<0.70	<0.84	n/a	n/a	n/a	n/a	0.8	n/a
S04M000115			Carbon Tetrachloride	ug/Kg	n/a	<1.3	92	n/a	n/a	n/a	n/a	1	n/a
S04M000115			Trichloroethene	ug/Kg	1.0e+02	<0.86	<1.0	n/a	n/a	n/a	1.0e+02	1	n/a
S04M000115			Benzene	ug/Kg	1.0e+02	<0.66	<0.79	n/a	n/a	n/a	1.0e+02	0.8	n/a
S04M000115			4-Methyl-2-pentanone	ug/Kg	n/a	<0.74	1.2	n/a	n/a	n/a	n/a	0.9	n/a
S04M000115			Tetrachloroethene	ug/Kg	n/a	<0.70	2.0	n/a	n/a	n/a	n/a	0.8	n/a
S04M000115			Toluene	ug/Kg	97	<0.64	1.3	n/a	n/a	n/a	94	0.8	n/a
S04M000115			Chlorobenzene	ug/Kg	1.0e+02	<0.76	<0.91	n/a	n/a	n/a	1.0e+02	0.9	n/a
S04M000115			Ethylbenzene	ug/Kg	n/a	<0.98	<1.2	n/a	n/a	n/a	n/a	1	n/a
S04M000115			Xylenes (total)	ug/Kg	n/a	<1.6	<1.9	n/a	n/a	n/a	n/a	2	n/a
S04M000115			1,1-Dichloroethene	ug/Kg	95	<0.76	<0.91	n/a	n/a	n/a	94	0.9	n/a

Attachment 2
Z9 TRENCH5
Data Summary Report

CORE NUMBER: 222S20040100
SEGMENT #: B17N64-A

SEGMENT PORTION: VOA

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000124			Vinyl Chloride	ug/Kg	n/a	<1.5	<1.3	n/a	n/a	n/a	n/a	1	n/a
S04M000124			Chloromethane	ug/Kg	n/a	<1.6	<1.4	n/a	n/a	n/a	n/a	1	n/a
S04M000124			Methylene Chloride	ug/Kg	n/a	<1.3	<1.1	n/a	n/a	n/a	n/a	1	n/a
S04M000124			Acetone	ug/Kg	n/a	7.2	79	n/a	n/a	n/a	n/a	0.8	n/a
S04M000124			1,1-Dichloroethane	ug/Kg	n/a	<0.80	<0.67	n/a	n/a	n/a	n/a	0.7	n/a
S04M000124			1,2-Dichloroethene (cis & tran	ug/Kg	n/a	<1.4	<1.2	n/a	n/a	n/a	n/a	1	n/a
S04M000124			Chloroform	ug/Kg	n/a	<0.72	13	n/a	n/a	n/a	n/a	0.6	n/a
S04M000124			1,2-Dichloroethane	ug/Kg	n/a	<0.76	<0.64	n/a	n/a	n/a	n/a	0.6	n/a
S04M000124			2-Butanone	ug/Kg	n/a	0.95	80	n/a	n/a	n/a	n/a	0.7	n/a
S04M000124			1,1,1-Trichloroethane	ug/Kg	n/a	<0.70	<0.59	n/a	n/a	n/a	n/a	0.6	n/a
S04M000124			Carbon Tetrachloride	ug/Kg	n/a	<1.3	2.4e+02	n/a	n/a	n/a	n/a	1	n/a
S04M000124			Trichloroethene	ug/Kg	99	<0.86	<0.72	n/a	n/a	n/a	n/a	0.7	n/a
S04M000124			Benzene	ug/Kg	98	<0.66	<0.56	n/a	n/a	n/a	n/a	0.6	n/a
S04M000124			4-Methyl-2-pentanone	ug/Kg	n/a	<0.74	<0.62	n/a	n/a	n/a	n/a	0.6	n/a
S04M000124			Tetrachloroethene	ug/Kg	n/a	<0.70	5.4	n/a	n/a	n/a	n/a	0.6	n/a
S04M000124			Toluene	ug/Kg	95	<0.64	<0.54	n/a	n/a	n/a	n/a	0.5	n/a
S04M000124			Chlorobenzene	ug/Kg	97	<0.76	<0.64	n/a	n/a	n/a	n/a	0.6	n/a
S04M000124			Ethylbenzene	ug/Kg	n/a	<0.98	<0.82	n/a	n/a	n/a	n/a	0.8	n/a
S04M000124			Xylenes (total)	ug/Kg	n/a	<1.6	<1.3	n/a	n/a	n/a	n/a	1	n/a
S04M000124			1,1-Dichloroethene	ug/Kg	94	<0.76	<0.64	n/a	n/a	n/a	n/a	0.6	n/a

Attachment 2
Z9 TRENCH5
Data Summary Report

CORE NUMBER: 222S20040100
SEGMENT #: B17N68

SEGMENT PORTION: VOA

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000116			Vinyl Chloride	ug/Kg	n/a	<1.5e+02	<1.7e+02	n/a	n/a	n/a	n/a	2.e+02	n/a
S04M000116			Chloromethane	ug/Kg	n/a	<1.6e+02	<1.8e+02	n/a	n/a	n/a	n/a	2.e+02	n/a
S04M000116			Methylene Chloride	ug/Kg	n/a	<1.3e+02	<1.4e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000116			Acetone	ug/Kg	n/a	<92	6.6e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000116			1,1-Dichloroethane	ug/Kg	n/a	<80	<89	n/a	n/a	n/a	n/a	9.e+01	n/a
S04M000116			1,2-Dichloroethene (cis & tran	ug/Kg	n/a	<1.4e+02	<1.5e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000116			Chloroform	ug/Kg	n/a	<72	<80	n/a	n/a	n/a	n/a	8.e+01	n/a
S04M000116			1,2-Dichloroethane	ug/Kg	n/a	<76	<84	n/a	n/a	n/a	n/a	8.e+01	n/a
S04M000116			2-Butanone	ug/Kg	n/a	<82	<91	n/a	n/a	n/a	n/a	9.e+01	n/a
S04M000116			1,1,1-Trichloroethane	ug/Kg	n/a	<70	<77	n/a	n/a	n/a	n/a	8.e+01	n/a
S04M000116			Carbon Tetrachloride	ug/Kg	n/a	<1.3e+02	<1.4e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000116			Trichloroethene	ug/Kg	83	<86	<95	n/a	n/a	n/a	91	9.e+01	n/a
S04M000116			Benzene	ug/Kg	94	<66	<73	n/a	n/a	n/a	1.0e+02	7.e+01	n/a
S04M000116			4-Methyl-2-pentanone	ug/Kg	n/a	<74	<82	n/a	n/a	n/a	n/a	8.e+01	n/a
S04M000116			Tetrachloroethene	ug/Kg	n/a	<70	<77	n/a	n/a	n/a	n/a	8.e+01	n/a
S04M000116			Toluene	ug/Kg	1.0e+02	<64	<71	n/a	n/a	n/a	1.1e+02	7.e+01	n/a
S04M000116			Chlorobenzene	ug/Kg	99	<76	<84	n/a	n/a	n/a	1.1e+02	8.e+01	n/a
S04M000116			Ethylbenzene	ug/Kg	n/a	<98	<1.1e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000116			Xylenes (total)	ug/Kg	n/a	<1.6e+02	<1.8e+02	n/a	n/a	n/a	n/a	2.e+02	n/a
S04M000116			1,1-Dichloroethene	ug/Kg	79	<76	<84	n/a	n/a	n/a	85	8.e+01	n/a

Attachment 2
Z9 TRENCH5
Data Summary Report

CORE NUMBER: 222S20040101
SEGMENT #: B191Y4

SEGMENT PORTION: VOA

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000118			Vinyl Chloride	ug/Kg	n/a	<1.5	<1.5	n/a	n/a	n/a	n/a	1	n/a
S04M000118			Chloromethane	ug/Kg	n/a	<1.6	<1.6	n/a	n/a	n/a	n/a	2	n/a
S04M000118			Methylene Chloride	ug/Kg	n/a	<1.3	<1.2	n/a	n/a	n/a	n/a	1	n/a
S04M000118			Acetone	ug/Kg	n/a	<0.92	41	n/a	n/a	n/a	n/a	0.9	n/a
S04M000118			1,1-Dichloroethane	ug/Kg	n/a	<0.80	<0.79	n/a	n/a	n/a	n/a	0.8	n/a
S04M000118			1,2-Dichloroethene (cis & tran	ug/Kg	n/a	<1.4	<1.4	n/a	n/a	n/a	n/a	1	n/a
S04M000118			Chloroform	ug/Kg	n/a	<0.72	14	n/a	n/a	n/a	n/a	0.7	n/a
S04M000118			1,2-Dichloroethane	ug/Kg	n/a	<0.76	<0.75	n/a	n/a	n/a	n/a	0.7	n/a
S04M000118			2-Butanone	ug/Kg	n/a	<0.82	22	n/a	n/a	n/a	n/a	0.8	n/a
S04M000118			1,1,1-Trichloroethane	ug/Kg	n/a	<0.70	<0.69	n/a	n/a	n/a	n/a	0.7	n/a
S04M000118			Carbon Tetrachloride	ug/Kg	n/a	<1.3	2.9e+02	n/a	n/a	n/a	n/a	1	n/a
S04M000118			Trichloroethene	ug/Kg	1.0e+02	<0.86	1.1	n/a	n/a	n/a	n/a	0.8	n/a
S04M000118			Benzene	ug/Kg	1.0e+02	<0.66	0.97	n/a	n/a	n/a	n/a	0.6	n/a
S04M000118			4-Methyl-2-pentanone	ug/Kg	n/a	<0.74	<0.73	n/a	n/a	n/a	n/a	0.7	n/a
S04M000118			Tetrachloroethene	ug/Kg	n/a	<0.70	1.6	n/a	n/a	n/a	n/a	0.7	n/a
S04M000118			Toluene	ug/Kg	97	<0.64	0.97	n/a	n/a	n/a	n/a	0.6	n/a
S04M000118			Chlorobenzene	ug/Kg	1.0e+02	<0.76	0.98	n/a	n/a	n/a	n/a	0.7	n/a
S04M000118			Ethylbenzene	ug/Kg	n/a	<0.98	<0.97	n/a	n/a	n/a	n/a	1	n/a
S04M000118			Xylenes (total)	ug/Kg	n/a	<1.6	<1.6	n/a	n/a	n/a	n/a	2	n/a
S04M000118			1,1-Dichloroethene	ug/Kg	95	<0.76	1.1	n/a	n/a	n/a	n/a	0.7	n/a

FLUOR Hanford Inc.	CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F03-018-097	Page 1 of 1
Collector Gent/Pope/Pfister/Hughes	Company Contact Steve Trent	Telephone No. 373-5869	Project Coordinator TRENT, SJ	Price Code 8N Air Quality ☐
Project Designation 216-Z-9 Trench Characterization Borehole - Soil	Sampling Location 216-Z-9/C3426		SAF No. F03-018	Data Turnaround 60 Days
Ice Chest No. ERC-99-005	Field Logbook No. HNF-N-3361	COA 119152ES10	Method of Shipment Government Vehicle	
Shipped To 222-S Lab Operations	Offsite Property No. N/A		Bill of Lading/Air Bill No. N/A	

POSSIBLE SAMPLE HAZARDS/REMARKS

RADIOACTIVE TIE TO: B191Y5

Special Handling and/or Storage

Preservation	Cool 4C	Cool 4C	None								
Type of Container	aGs*	aG	P								
No. of Container(s)	3	1	1								
Volume	40mL	60mL	500mL								

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time	See item (1) in Special Instructions	See item (2) in Special Instructions	See item (3) in Special Instructions						
B191Y4	SOIL	4/21/04	0930	X	X	X						

4/28/04 returned to customer on new chain of custody

These two bottles were relabeled as B191Y7 for return. EAB 4/29/04

CHAIN OF POSSESSION	Sign/Print Names			
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
FMG-ENT/POPE	4/21/04 1410	Greg Thomas	4/21/04 1415	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
Greg Thomas	4/21/04 1420	R.R. Steele	4/21/04 1420	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	

SPECIAL INSTRUCTIONS

** The laboratory is to achieve a detection limit of 5 pCi/g and 10 pCi/g for gross alpha and gross beta, respectively.

(1) VOA - 8260A - Complete; VOA - 8260A (Add-On) {Acetonitrile, Hexane, n-Butylbenzene}
(2) ~~Semi-VOA - 8270A (TCL); Semi-VOA – 8270A (Add-On) {1,2,4-Trimethylbenzene, Cyclohexanone, Tributyl phosphate}~~
(3) Gross Alpha; ~~Gross Beta; Gamma Spectroscopy~~ {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - ~~Add-on~~ {Antimony-125, Cesium-134}; Americium-241; Isotopic Plutonium; Isotopic Thorium {Thorium-232}; Isotopic Uranium; ~~Strontium-89,90~~ – Sr-90; Neptunium-237; Total Uranium

EAB 4/28/04

60mL and 500mL bottles associated with these analyses were returned to customer on a new chain of custody per email request from S.J. Trent 4/28/04

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

A-6003-618(03/03)

GENERATOR KNOWLEDGE INFORMATION

1. Chain of Custody Number _____ CACN/COA 118478ES20 Customer Identification Number _____

2. List generator knowledge or description of process that produced sample. Or list description of sample source:

216-Z-9 Trench DNAPL Investigation

MSDS Available? (●) No ( ) Yes Hanford MSDS No. _____

3. List all waste codes and constituents associated with the waste or media that was sampled, regardless of CERCLA status.

a) Does the sample contain any of the following listed waste codes?

By checking "unknown" the customer understands that no knowledge is available following a careful search.

	List Federal Waste Code(s):	List Constituent(s):			
P Codes:	_____	_____	( ) Yes	(●) No	( ) Unknown
U Codes:	_____	_____	( ) Yes	(●) No	( ) Unknown
K Codes:	_____	_____	( ) Yes	(●) No	( ) Unknown
F Codes:	F001	Carbon tetrachloride	(●) Yes	( ) No	( ) Unknown

b) List applicable characteristic waste codes, flash point, pH, constituents, and concentrations as appropriate.

D001:	☐ FP <100°F	☐ FP ≥100 <140°F	☐ DOT Oxidizer	( ) Yes	(●) No	( ) Unknown
D002:	☐ pH ≤2	☐ pH ≥12.5	☐ Solid Corrosive (WSC2)	( ) Yes	(●) No	( ) Unknown
D003:	☐ Cyanide	☐ Sulfide	☐ Water Reactive	☐ Other _____	( ) Yes	(●) No	( ) Unknown
D004-D043 (Identify applicable waste codes and concentrations):				(i.e., peroxide former, explosive, air reactive)	( ) Yes	(●) No	( ) Unknown

c) If characteristic, list any known underlying hazardous constituents (UHCs) reasonably expected to be present, and their concentrations that may be present above the LDR treatment standard (40 CFR 268.48):

N/A

d) List any known Land Disposal Restrictions (LDR) subcategories, if applicable (40 CFR 268.40):

N/A

e) List any applicable Washington State dangerous waste codes: (not required if federally regulated)

WT01:	( ) Yes	(●) No	( ) Unknown
WT02:	( ) Yes	(●) No	( ) Unknown
W001:	( ) Yes	(●) No	( ) Unknown

List constituents and concentrations:

(*State mixture rule for ignitability)

WP01:	( ) Yes	(●) No	( ) Unknown
WP02:	( ) Yes	(●) No	( ) Unknown
WP03:	( ) Yes	(●) No	( ) Unknown
F003:*	( ) Yes	(●) No	( ) Unknown

4. Is this material TSCA regulated for PCBs? ( ) Yes (●) No ( ) Unknown ( ) Analysis Requested

List concentration if applicable: _____

If yes, what is the source of the PCBs? (see TSCA PCB Hanford Site User Guide, DOE/RL-2001-50)

☐ PCB Liquid Waste ☐ PCB Bulk Product Waste ☐ PCB Transformer ≥500 ppm ☐ Unknown
☐ PCB Remediation Waste ☐ PCB R&D Waste ☐ PCB contaminated electrical equipment (capacitor/ballast) <500 ppm
☐ PCB Spill Material ☐ PCB Item ☐ Other PCB Waste (list) _____

5. Is this material TRU? ( ) Yes ( ) No (●) Unknown

6 ACCURACY OF INFORMATION

Based on my inquiry of those individuals immediately responsible for obtaining this information, that to the best of my knowledge, the information entered in this document is true, accurate, and complete.

Print & Sign _____ Date 10/6/03

Attachment 2
Z9 TRENCH5
Data Summary Report

CORE NUMBER: 222S20040101
SEGMENT #: B191Y4-A

SEGMENT PORTION: VOA

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S04M000123			Vinyl Chloride	ug/Kg	n/a	<1.5e+02	<1.5e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000123			Chloromethane	ug/Kg	n/a	<1.6e+02	<1.6e+02	n/a	n/a	n/a	n/a	2.e+02	n/a
S04M000123			Methylene Chloride	ug/Kg	n/a	<1.3e+02	<1.2e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000123			Acetone	ug/Kg	n/a	<92	5.9e+02	n/a	n/a	n/a	n/a	9.e+01	n/a
S04M000123			1,1-Dichloroethane	ug/Kg	n/a	<80	<79	n/a	n/a	n/a	n/a	8.e+01	n/a
S04M000123			1,2-Dichloroethene (cis & tran	ug/Kg	n/a	<1.4e+02	<1.4e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000123			Chloroform	ug/Kg	n/a	<72	<71	n/a	n/a	n/a	n/a	7.e+01	n/a
S04M000123			1,2-Dichloroethane	ug/Kg	n/a	<76	<75	n/a	n/a	n/a	n/a	7.e+01	n/a
S04M000123			2-Butanone	ug/Kg	n/a	<82	<81	n/a	n/a	n/a	n/a	8.e+01	n/a
S04M000123			1,1,1-Trichloroethane	ug/Kg	n/a	<70	<69	n/a	n/a	n/a	n/a	7.e+01	n/a
S04M000123			Carbon Tetrachloride	ug/Kg	n/a	<1.3e+02	<1.3e+02	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000123			Trichloroethene	ug/Kg	83	<86	<85	n/a	n/a	n/a	n/a	8.e+01	n/a
S04M000123			Benzene	ug/Kg	94	<66	<65	n/a	n/a	n/a	n/a	6.e+01	n/a
S04M000123			4-Methyl-2-pentanone	ug/Kg	n/a	<74	<73	n/a	n/a	n/a	n/a	7.e+01	n/a
S04M000123			Tetrachloroethene	ug/Kg	n/a	<70	<69	n/a	n/a	n/a	n/a	7.e+01	n/a
S04M000123			Toluene	ug/Kg	1.0e+02	<64	<63	n/a	n/a	n/a	n/a	6.e+01	n/a
S04M000123			Chlorobenzene	ug/Kg	99	<76	<75	n/a	n/a	n/a	n/a	7.e+01	n/a
S04M000123			Ethylbenzene	ug/Kg	n/a	<98	<97	n/a	n/a	n/a	n/a	1.e+02	n/a
S04M000123			Xylenes (total)	ug/Kg	n/a	<1.6e+02	<1.6e+02	n/a	n/a	n/a	n/a	2.e+02	n/a
S04M000123			1,1-Dichloroethene	ug/Kg	79	<76	<75	n/a	n/a	n/a	n/a	7.e+01	n/a

CH2M-0401824

Attachment 3

SAMPLE BREAKDOWN DIAGRAM

Consisting of 6 pages, including coversheet

Z9 TRENCH4
216-Z-9 Borehole samples
Group 222S20040061

B17N61

3x40 mL amber
glass septum bottle
(cool 4°C)

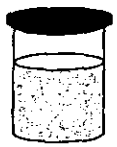
S04M000022
VOA
(Method 8260B)

(low-level)

Z9 TRENCH5
216-Z-9 Borehole samples
Group 222S20040073

B18XR8

60 mL amber glass septum bottle (cool 4°C)



S04M000099
Received

- SVOA Extract → S04M000106: SVOA (Method 8270C)
- PCB Extract → S04M000107: PCB (Method 8082)

B190T8-A

20 mL glass/poly

S04M000097
GEA radscreen

- Environmental Acid Digest → S04M000108: ^{238}Pu and $^{239/240}Pu$

B18XR8

60 mL amber glass septum bottle (cool 4°C)

S04M000100
Received

- Environmental Acid Digest → S04M000228: ^{90}Sr
- Water Digest → S04M000102: IC: F, Cl, NO_3, NO_2, PO_4, SO_4

B18XR8

120 ml bottle (cool 4°C)

S04M000101
Received
Hg
pH
CN
Sulfide

- Acid Digest → S04M000103: ICP: Sb, As, Ba, Be, Bi, Cd, Cr, Cu, Pb, Li, Mn, Ni, Se, Ag, P, Sr, Zn
- Environmental Acid Digest → S04M000104: Total Alpha/Beta; ^{237}Np; ^{241}Am; ^{238}Pu; $^{239/240}Pu$; GEA: ^{60}Co, ^{125}Sb, ^{134}Cs, ^{137}Cs, ^{152}Eu, ^{154}Eu, ^{155}Eu; ICP/MS: ^{233}U, ^{234}U, ^{235}U, ^{238}U, ^{232}Th; Total Uranium
- NH_4 Distillation → S04M000105: IC: NH_4

Z9 TRENCH5
216-Z-9 Borehole samples
Group 222S20040073

B18XW3

3x40 mL amber
glass septum bottle
(cool 4°C)

S04M000096
VOA
(Method 8260B)

(low-level)

B18XR8

3x5 g EnCore
Sampler
(cool 4°C)

S04M000095
VOA
(Method 8260B)

(high-level)

Z9 TRENCH5
216-Z-9 Borehole samples
Group 222S20040100

B17N64

3x40 mL amber
glass septum bottle
(cool 4°C)

S04M000115
VOA
(Method 8260B)

(low-level)

B17N64-A

2x40 mL amber
glass septum bottle
(cool 4°C)

S04M000124
VOA
(Method 8260B)

(additional low-level
analysis)

B17N68

3x5 g EnCore
Sampler
(cool 4°C)

S04M000116
VOA
(Method 8260B)

(high-level)

Z9 TRENCH5
216-Z-9 Borehole samples
Group 222S20040101

B191Y4

3x40 mL amber glass septum bottle (cool 4°C)

S04M000118

VOA
(Method 8260B)
(preserved a portion for low-level analysis)

B191Y4-A

S04M000123

VOA
(Method 8260B)
(preserved a portion for high-level analysis)

B191Y4

60 mL amber glass bottle (cool 4°C)

S04M000119

Received

B191Y4

500 mL bottle

S04M000120

Received

Analysis request was cancelled per customer contact on 4/28/04. Samples were returned to customer on 4/29/04.

CH2M-0401824

Attachment 4

SAMPLE RECEIPT PAPERWORK

Consisting of 12 pages, including coversheet

FLUOR Hanford Inc.	CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F03-018-058	Page 1 of 1
Collector Pope/Pfister/Hughes	**Company Contact** Steve Trent **Telephone No.** 373-5869	**Project Coordinator** TRENT, SJ	**Price Code** 8N **Data Turnaround** 60 Days
Project Designation 216-Z-9 Trench Characterization Borehole - Soil	**Sampling Location** ~~86'-88.5'~~ 90'-92.5' (AGW 2/24/04) 216-Z-9/C3426 - Interval	**SAF No.** F03-018	**Air Quality** ☐
Ice Chest No. GRP-04-008	**Field Logbook No.** HNF-N-3361 **COA** 119152ES10	**Method of Shipment** Government Vehicle	
Shipped To 222-S Lab Operations	**Offsite Property No.** N/A	**Bill of Lading/Air Bill No.** N/A	

POSSIBLE SAMPLE HAZARDS/REMARKS

RADIOACTIVE TIE TO: B17NN0

Special Handling and/or Storage

SAMPLERS: Collect 5 g with the encore sampler. If RAD <0.5 mrem/hr take sample to WSCF. Sample analysis must occur in 48 hours or preserve with methanol.

Preservation	Cool 4C										
Type of Container	P										
No. of Container(s)	3										
Volume	5g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										
Sample No.	Matrix *	Sample Date	Sample Time								
B17N61	SOIL	3-23-4	0835	—							

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 3-23-4 12:30	Received By/Stored In in Cooler on Ice 21629 RMA Trailer Fridge	Date/Time 3-23-4 12:30
Relinquished By/Removed From	Date/Time 13:30	Received By/Stored In	Date/Time 13:30 5-24-4
21629 RMA Trailer Fridge 3-24-4			
Relinquished By/Removed From	Date/Time 3-23-4 13:45	Received By/Stored In RLC Mailroom	Date/Time 1345 3-24-4
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) VOA - 8260A - Complete; VOA - 8260A (Add-On) (Acetonitrile, Hexane, n-Butylbenzene)

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

A-6003-618(03/03)

FLUOR Hanford Inc.	CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F03-018-082	Page 1 of 1
Collector Pope/Pfister/Hughes/Wiberg	Company Contact Steve Trent Telephone No. 373-5869	Project Coordinator TRENT, SJ	Price Code 8N Data Turnaround 60 Days Air Quality ☐
Project Designation 216-Z-9 Trench Characterization Borehole - Soil	Sampling Location 216-Z-9/C3426 DEPTH 110'-112.5'	SAF No. F03-018	
Ice Chest No.	Field Logbook No. HNF-N-3361 COA 119152ES10	Method of Shipment Government Vehicle	
Shipped To 222-S Lab Operations	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A	

POSSIBLE SAMPLE HAZARDS/REMARKS Special Handling and/or Storage												
	Preservation	Cool 4C										
	Type of Container	P										
	No. of Container(s)	3										
	Volume	5g										
SAMPLE ANALYSIS		See item (1) in Special Instructions.										
Sample No.	Matrix *	Sample Date	Sample Time									
B18XR8	SOIL	4/8/04	1015	✓								

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From Dane Wiberg	Date/Time 4/8/04 1435	Received By/Stored In Site Frig	Date/Time 4/8/04 1435
Relinquished By/Removed From Site Frig	Date/Time 4/8/04 1534	Received By/Stored In David Tyra/Dan Dr	Date/Time 4/8/04 1534
Relinquished By/Removed From David Tyra/Dan Dr	Date/Time 4/8/04 1556	Received By/Stored In Keith Fuller for M. Rollison	Date/Time 4/8/04 1558
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) VOA - 8260A - Complete; VOA - 8260A (Add-On) {Acetonitrile, Hexane, n-Butylbenzene}

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

A-6003-618(03/03)

0000044

FLUOR Hanford Inc.	CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F03-018-091	Page 1 of 1
Collector Pope/Pfister/Hughes/Wiberg	Company Contact Steve Trent Telephone No. 373-5869	Project Coordinator TRENT, SJ	Price Code 8N Data Turnaround 60 Days
Project Designation 216-Z-9 Trench Characterization Borehole - Soil	Sampling Location 216-Z-9/C3426 110'-112.5' VAP	SAF No. F03-018	Air Quality ☐
Ice Chest No. S/N 2/03-050024	Field Logbook No. HNF-N-3361 COA 119152ES10	Method of Shipment Government Vehicle	
Shipped To 222-S Lab Operations	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A	

POSSIBLE SAMPLE HAZARDS/REMARKS												
Special Handling and/or Storage	Preservation	Cool 4C										
	Type of Container	G										
	No. of Container(s)	3										
	Volume	40mL										
SAMPLE ANALYSIS		See item (1) in Special Instructions.										

Sample No.	Matrix *	Sample Date	Sample Time									
B18XW3	SOIL	4-8-4	1615	✓								

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
R PFISTER/12 MVK	4-8-4 1435	SITE FRIG	4-8-4 1435
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Site Frig	4/14/04 1015	Greg Thomas/Greg Thomas	4/14/04 1015
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Greg Thomas/Greg Thomas	4/14/04 1100	R+Steele R+Steele	4/14/04 1100
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) VOA - 8260A - Complete; VOA - 8260A (Add-On) (Acetonitrile, Hexane, n-Butylbenzene)

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

A-6003-618(03/03)

RADIOACTIVE SHIPMENT RECORD

0000327 3.

Page1 of1

1. SHIP FROM U.S. DEPT. OF ENERGY C/O
Company Fluor Hanford, Inc
Address Z-9 Trench / 200W
City, State, Zip Richland, WA 99352
Contact M. A. Baechler
Phone 509-531-0638

Ship ☒ Prepaid ☐ Collect 4.

Via ☒ Motor ☐ Air Psgr ☐ UPS ☐ Rail ☐ Air Cargo ☐ Site Carrier

SHIPMENT AUTHORIZATION NUMBER N/A

2. SHIP TO
Company CH2M Hill Hanford Group
Address 222-S Analytical Laboratory / 200W
City, State, Zip Richland, WA 99352
Attention R. A. Bushaw
Phone 509-373-4314

Markings Applied 6.	
Radioactive - LSA	☐
Radioactive - SCO	☐
Type A	☒
Type B with trefoil	☐

LSA Description 8.	
LSA-I MAB 4/14/04	☐
LSA-II	☐
LSA-III	☐
SCO-I	☐
SCO-II	☐

Labels Applied 10.	
Empty	☐
Radioactive White - I	☒
Radioactive Yellow - II	☐
Radioactive Yellow - III	☐
Subsidiary Hazard	☐

For Normal Form only 7.
Identify
Physical Form ☐ Liquid ☐ Gas ☒ Solid
Chemical Form ☐ Elemental ☐ Metal ☐ Nitrate ☒ Oxide ☐ Mixture ☐ Other

EMERGENCY RESPONSE 9.
Telephone 509-373-3800
Emergency Response Guide(s) 163

Highway Route Controlled Quantity ☐
Exclusive Use Shipment with Instructions ☐
Placards Applied ☐
If Rail Specify: _____
Fissile Excepted, Grams 2.612E-5 ☒
Excepted Package Statement ☐

5. HM — Proper Shipping Name: _____ Radioactive Material,

	excepted package - empty packaging	7	UN2910
	excepted package - instruments or articles	7	UN2910
	excepted package - limited quantity of material	7	UN2910
	excepted package - articles manufactured from natural or depleted uranium or natural thorium	7	UN2910
	Special Form, n.o.s.	7	UN2974
	Low Specific Activity, n.o.s.	7	UN2912
	n.o.s.	7	UN2982
	Fissile, n.o.s.	7	UN2918
	Surface Contaminated Object	7	UN2913
X	Type A Package	7	UN2915

Warning -- Fissile Material Controlled Shipment. Do Not Load More Than _____ Packages Per Vehicle. In Loading and Storage Areas, Keep at Least 20 Feet From Other Packages Bearing Radioactive Labels.

11.

No. Pkg.	Model Package	COC/Spec	Serial No.	Seal No.	Isotopes	T.I.	Bq/Package	Gr. Wt. Kg.
1	VPS-BXKT-	4H2V/X71/S/03/USA	2/03-05024	N/A	Am-241, Pu-239	0	5.40E5	35
	005C	/M4563						
(Shipper may describe package in detail on one of the unused lines above)					TOTALS	0	5.40E5	35

12. This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.
Certifier's Signature M.A. Baechler | On behalf of DOE-RL | Date 04/14/2004 | Organization FH Geosciences Support | Complete Cost Code (Inc. End Function) 119152ES20

13. Surface Dose Rate of Package
☒ <0.005 or _____ mSv/hr
<0.5 or _____ mrem/hr (N+ß γ)

Dose Rate @ 1 Meter from Surface of Package
☒ <0.005 or _____ mSv/hr
<0.5 or _____ mrem/hr (N+ß γ)

Smears of Outer Container
☒ <0.41 Bq (22 dpm) ß γ /cm²
☒ <0.04 Bq (2.2 dpm) α /cm²
☒ <Tbl. 2-2 HSRCM Onsite Limits

TRUCK LOAD OR EXCLUSIVE USE
Surface ☒ <2 mSv/hr (200 mrem/hr)
@ 2 meters ☒ <0.1 mSv/hr (10 mrem/hr)
@ Cab or sleeper ☒ <0.02 mSv/hr (2 mrem/hr) (Using N+ß γ)

Additional Data and Instructions (inc. Readings on Internal Packaging) N/A

Signature - Radiation Monitoring R. Shane Bates | Bldg. NEAR Z-9 CRIB | Survey No. GW-04-0358 | Date 4/14/04

14. TRANSPORTER
Vehicle Number 6163062691 | DRIVER SIGNATURE M.A. Baechler

RECEIVER
RECEIVER SIGNATURE | Date 4/14/04

15. OFFSITE AUTHORIZATION
Shipment has been inspected and verified to be in compliance with DOT regulations
Authorized Signature | Printed Name | Date

16. AUTHORIZATION FOR SHIPMENT

AIR TRANSPORT CERTIFICATION	CARGO AIRCRAFT	PASSENGER AIRCRAFT		Pkg. Dimensions (cm)
☐ N/A	☐ Cargo Aircraft Only Labels Applied	☐ Ltd Qty ☐ <3 T.I.	☐ Research/Medical Diagnosis ☐ Human Medical Research	

17. OFFSITE AUTHORIZATION

Tracking No.	Date Shipped	Routing	ETA
Surveyed By	Date	Approved for Shipment Offsite	Date

A-6003-214 (08/01)

0000004

FLUOR Hanford Inc.	CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F03-018-096	Page 1 of 1
Collector: PHIL GENT	Company Contact: STEVE TRENT; Telephone No.: 373 5869	Project Coordinator: TRENT, SJ	Price Code: 8N; Data Turnaround: 60 Days
Project Designation: 216-Z-9 Trench Characterization Borehole - Soil	Sampling Location: 216-Z-9 / C3426 112'	SAF No.: F03-018	Air Quality ☐
Ice Chest No.: GRP-04-006	Field Logbook No.: HNF-N-3601; COA: 119152 ES10	Method of Shipment: G.V.	
Shipped To: 222-S Lab Operations	Offsite Property No.: N/A	Bill of Lading/Air Bill No.: N/A	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	NONE
Type of Container	P
No. of Container(s)	1
Volume	20mL

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time	
B190T8	SOIL	4/15/04	1413	V

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
P.M. GENT	4/15/04 1500	RA Bushaw / RA Bushaw for R Chambers	4/15/04 1500
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

A-6003-618(03/03)

FLUOR Hanford Inc.	CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F03-018-082	Page 1 of 1
Collector Pope/Pfister/Hughes/Wiberg	Company Contact Steve Trent	Telephone No. 373-5869	Project Coordinator TRENT, SJ	Price Code 8N Air Quality ☐
Project Designation 216-Z-9 Trench Characterization Borehole - Soil	Sampling Location 216-Z-9/C3426		SAF No. F03-018	Data Turnaround 60 Days
Ice Chest No.	Field Logbook No. HNF-N-3361	COA 119152ES10	Method of Shipment Government Vehicle	
Shipped To 222-S Lab Operations	Offsite Property No. N/A		Bill of Lading/Air Bill No. N/A	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool 4C	Cool 4C									
Type of Container	aG	G/P									
No. of Container(s)	2	1									
Volume	60mL	120mL									
SAMPLE ANALYSIS	See item (1) in Special Instructions.	See item (2) in Special Instructions.									
Sample No.	Matrix *	Sample Date	Sample Time								
B18XR8	SOIL	4/8/04	1015	X	X						

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Chase Wiberg (Chase)	4/8/04 1435	Site Fridge	4/8/04 1435
Relinquished By/Removed From	Date/Time 1100	Received By/Stored In	Date/Time 1100
Site Fridge	4/16/04	Greg Thomas & Greg Thomas	4/16/04
Relinquished By/Removed From	Date/Time 1130	Received By/Stored In	Date/Time
Greg Thomas & Greg Thomas	4/16/04	Jessie Dey	4/16/04 11:30
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) Semi-VOA - 8270A (TCL); Semi-VOA -- 8270A (Add-On) {1,2,4-Trimethylbenzene, Cyclohexanone, Tributyl phosphate}; PCBs - 8082
(2) ICP Metals - 6010A (TAL); ICP Metals - 6010A (Add-on) {Arsenic, Beryllium, Bismuth, Lead, Lithium, Phosphorus, Selenium, Strontium}; Mercury - 7471 - (CV); IC Anions - 300.0 {Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphate, Sulfate}; Ammonia ~~350.1~~ 300.7; Total Cyanide - 9010; Sulfides - 9030; pH (Soil) - 9045

SDG 4/15/04

Sample shippers removed the Sample custody seal during repackaging for shipment & then sealed the transportation Container.

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
	Jessie Dey	Sample Custodian	4/16/04 11:30
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

A-6003-618(03/03)

RADIOACTIVE SHIPMENT RECORD

0000331 3.

Page1 of1

1. SHIP FROM U.S. DEPT. OF ENERGY C/O
Company Fluor Hanford, Inc.
Address Z-9 Trench / 200W
City, State, Zip Richland, WA 99352
Contact M. A. Baechler
Phone 509-531-0638

Ship ☒ Prepaid ☐ Collect 4.

Via ☒ Motor ☐ Air Psgr ☐ UPS ☐ Rail ☐ Air Cargo ☐ Site Carrier

SHIPMENT AUTHORIZATION NUMBER N/A

2. SHIP TO
Company CH2M Hill Hanford Group
Address 222-S Laboratory / 200W
City, State, Zip Richland, WA 99352
Attention R. A. Bushaw
Phone 509-373-4314

5. HM Proper Shipping Name: _____ Radioactive Material,

	excepted package - empty packaging	7	UN2910
	excepted package - instruments or articles	7	UN2910
	excepted package - limited quantity of material	7	UN2910
	excepted package - articles manufactured from natural or depleted uranium or natural thorium	7	UN2910
	Special Form, n.o.s.	7	UN2974
	Low Specific Activity, n.o.s.	7	UN2912
	n.o.s.	7	UN2982
	Fissile, n.o.s.	7	UN2918
	Surface Contaminated Object	7	UN2913
X	Type A Package	7	UN2915

Markings Applied 6.
- Radioactive - LSA ☐
- Radioactive - SCO ☐
- Type A ☒
- Type B with trefoil ☐

LSA Description 8.
- LSA-I ☐
- LSA-II ☐
- LSA-III ☐
- SCO-I ☐
- SCO-II ☐

MAB 4/15/04

Labels Applied 10.
- Empty ☐
- Radioactive White - I ☒
- Radioactive Yellow - II ☐
- Radioactive Yellow - III ☐
- Subsidiary Hazard ☐

For Normal Form only 7.
Identify
Physical Form ☐ Liquid ☐ Gas ☒ Solid
Chemical Form ☐ Elemental ☐ Metal ☐ Nitrate ☒ Oxide ☐ Mixture ☐ Other

EMERGENCY RESPONSE 9.
Telephone 509-373-3800
Emergency Response Guide(s) 163

Highway Route Controlled Quantity ☐
Exclusive Use Shipment with Instructions ☐
Placards Applied ☐
If Rail Specify: _____
Fissile Excepted, Grams 3.55E-4 ☒
Excepted Package Statement ☐

Warning -- Fissile Material Controlled Shipment. Do Not Load More Than N/A Packages Per Vehicle. In Loading and Storage Areas, Keep at Least 20 Feet From Other Packages Bearing Radioactive Labels.

11.	No. Pkg.	Model Package	COC/Spec	Serial No.	Seal No.	Isotopes	T.I.	Bq/Package	Gr. Wt. Kg.
	1	VPS-BXKT-	4H2V/X71/S/03/USA	2/03-	N/A	Am-241, Pu-239	0	6.61E6	35
		005	/M4563	050024					

(Shipper may describe package in detail on one of the unused lines above) TOTALS 0 6.61E6 35

12. This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.
Certifier's Signature M. A. Baechler On behalf of DOE-RL | Date 04/16/2004 | Organization FH Geosciences Support | Complete Cost Code (Inc. End Function) 119152ES20

13. Surface Dose Rate of Package: ☒ <0.005 or _____ mSv/hr; ☐ <0.5 or _____ mrem/hr (N+ß γ)
Dose Rate @ 1 Meter from Surface of Package: ☒ <0.005 or _____ mSv/hr; ☐ <0.5 or _____ mrem/hr (N+ß γ)
Smears of Outer Container: ☒ <0.41 Bq (22 dpm) ß γ /cm²; ☒ <0.04 Bq (2.2 dpm) α /cm²; ☒ <Tbl. 2-2 HSRCM Onsite Limits
TRUCK LOAD OR EXCLUSIVE USE: Surface ☒ <2 mSv/hr (200 mrem/hr); @ 2 meters ☒ <0.1 mSv/hr (10 mrem/hr); @ Cab or sleeper ☒ <0.02 mSv/hr (2 mrem/hr) (Using N+ß γ)
Additional Data and Instructions (inc. Readings on Internal Packaging)
Signature - Radiation Monitoring R. Shuck | Bldg. NEAR Z-9 CRIB | Survey No. GW-04-0365 | Date 4/16/04

14. TRANSPORTER
Vehicle Number 6163/6229 | DRIVER SIGNATURE M. A. Baechler
RECEIVER
RECEIVER SIGNATURE Leslie Day | Date 4/16/04

15. OFFSITE AUTHORIZATION
Shipment has been inspected and verified to be in compliance with DOT regulations
Authorized Signature | Printed Name | Date

16. AUTHORIZATION FOR SHIPMENT
AIR TRANSPORT CERTIFICATION ☐ N/A
CARGO AIRCRAFT ☐ Cargo Aircraft Only Labels Applied
PASSENGER AIRCRAFT ☐ Ltd Qty ☐ Research/Medical Diagnosis ☐ <3 T.I. ☐ Human Medical Research
Pkg. Dimensions (cm)

17. OFFSITE AUTHORIZATION

Tracking No.	Date Shipped	Routing	ETA
Surveyed By	Date	Approved for Shipment Offsite	Date

A-6003-214 (08/01)

0000045

FLUOR Hanford Inc.	CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F03-018-059	Page 1 of 1

Collector Pope/Pfister/Hughes	**Company Contact** Steve Trent **Telephone No.** 373-5869	**Project Coordinator** TRENT, SJ	**Price Code** 8N **Data Turnaround** 60 Days
Project Designation 216-Z-9 Trench Characterization Borehole - Soil	**Sampling Location** 216-Z-9/C3426 - Interval 119'-121.5'	**SAF No.** F03-018	**Air Quality** ☐
Ice Chest No. GPP-03-006	**Field Logbook No.** 4-1504 19C HNF-N ~~3361~~ 360-1 **COA** 119152ES10	**Method of Shipment** Government Vehicle	
Shipped To 222-S Lab Operations	**Offsite Property No.** N/A	**Bill of Lading/Air Bill No.** N/A	

POSSIBLE SAMPLE HAZARDS/REMARKS

RADIOACTIVE TIE TO: B17NN4

Special Handling and/or Storage

SAMPLERS TO PUT 5 g soil into each vial with the encore sampler. Bottles are pre-labeled. Write the Heis number from the chain on each vial.

Preservation	Cool 4C										
Type of Container	aGs*										
No. of Container(s)	5										
Volume	40mL										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										
Sample No.	Matrix *	Sample Date	Sample Time								
B17N64	SOIL	4-21-4	1400	✓							

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Dana Wibking Dana Wibking	4/21/04 15:30	RHStaal RHStaal	09/21/04 1545
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

** 222-S Laboratory will provide 40 mL VOA vials that have been pre-preserved with sodium bisulfate.

(1) VOA - 8260A - Coniplete; VOA - 8260A (Add-On) {Acetonitrile, Hexane, n-Butylbenzene}

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

A-6003-618(03/03)

FLUOR Hanford Inc.	CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F03-018-060	Page 1 of 1
Collector Pope/Pfister/Hughes	**Company Contact** Steve Trent **Telephone No.** 373-5869		**Project Coordinator** TRENT, SJ	**Price Code** 8N **Air Quality** ☐	**Data Turnaround** 60 Days
Project Designation 216-Z-9 Trench Characterization Borehole - Soil	**Sampling Location** 216-Z-9/C3426 - Interval 119'-121.5'		**SAF No.** F03-018		
Ice Chest No. GPP-03-006	**Field Logbook No.** 4-19-03 ~~HNF-N-2361~~ 360-1	**COA** 119152ES10	**Method of Shipment** Government Vehicle		
Shipped To 222-S Lab Operations	**Offsite Property No.** N/A		**Bill of Lading/Air Bill No.** N/A		

POSSIBLE SAMPLE HAZARDS/REMARKS

RADIOACTIVE TIE TO: B17NN4

Special Handling and/or Storage

SAMPLERS: Collect 5 g with the encore sampler. If RAD <0.5 mrem/hr take sample to WSCF. Sample analysis must occur in 48 hours or preserve with methanol.

Preservation	Cool 4C										
Type of Container	P										
No. of Container(s)	3										
Volume	5g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										
Sample No.	Matrix *	Sample Date	Sample Time								
B17N68	SOIL	4-21-4	1400	✓							

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 4/21/04	Received By/Stored In	Date/Time 4/21/04
Dana Wiberg Dana Wiberg for [illegible]		R Patel R Stede	15:45
Relinquished By/Removed From	Date/Time 1545	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) VOA - 8260A - Complete; VOA - 8260A (Add-On) {Acetonitrile, Hexane, n-Butylbenzene}

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

A-6003-618(03/03)